SERIEs (2013) 4:61–81
DOI 10.1007/s13209-011-0084-1

ORIGINAL ARTICLE

Advertising bans

Massimo Motta

Received: 22 February 2010 / Accepted: 29 November 2011 / Published online: 17 December 2011

Abstract I show that an advertising ban is more likely to increase—rather than decrease—total consumption when advertising does not bring about a large expansion of market demand at given prices and when it increases product differentiation (thus allowing firms to command higher prices). In this case, the main impact of a ban on advertising is to reduce equilibrium prices and thus increase demand. I argue that this is more likely to happen in mature industries where consumer goods are ex-ante (i.e. without advertising) similar and advertising is of the 'price-increasing' type. The ban is the more likely to increase profits of the firms the weaker the ability of advertising to expand total demand and the less advertising serves to induce product differentiation.

Keywords Advertising · Bans · Product differentiation · Regulation · Tobacco · Alcohol

JEL Classification K2 · L51

This is a substantially revised version of a working paper (Motta 1997) bearing the same title, and long forgotten in a drawer. I would like to thank H. Fickel and H. Savelkouls for stimulating discussions, A. Cabrales, A. Ciccone, R. Fauli-Oller, A. Holly, H. Hopenhayn, A. Irmen, J. Markusen, J. Miron, T. Nilssen, M. Polo, K. Stahl and T. Von Ungern-Sternberg, as well as seminar audiences at Lausanne, Mannheim, Louvain-la-Neuve, WZB Berlin, Lisbon (Univ. Nova) and Toulouse (European Economic Association Meeting) for their comments on previous drafts. Thanks also to the Editor, Victor Aguirregabiria, and two anonymous referees for their suggestions, as well as to Ilaria Masiero for research assistance. Financial aid from the Spanish Ministry of Science and Innovation (project ECO2010-15052) is gratefully acknowledged.

M. Motta
ICREA-Universitat Pompeu Fabra and Barcelona Graduate School of Economics, Barcelona, Spain

M. Motta (✉)
Department of Economics, Universitat Pompeu Fabra, C/Ramon Trias Fargas 25-27,
08005 Barcelona, Spain
e-mail: massimo.motta@upf.edu

1 Introduction and summary

In many countries, complete bans or restrictions on advertising for products which are often thought of as dangerous or associated to health problems (such as tobacco and alcoholic drinks) have been advocated. This has led a number of national governments, especially in OECD countries, to approve regulations which prevent producers and retailers from advertising such goods or which restrict their advertising activities to certain media (for instance by prohibiting television and radio commercials).

The rationale behind such limitations on advertising is that advertising raises aggregate demand. By banning or limiting advertising, the desired reduction of consumption would be obtained.

Yet, there is very little evidence that advertising has a positive impact on the total demand for the goods advertised, either in general or more specifically in industries which are more frequently targeted by regulations, like tobacco and alcoholic drinks. Duffy (1996) surveys most of the empirical works on the effect of advertising on tobacco consumption (among others, see Baltagi and Levin 1986; Hamilton 1972; Johnston 1980; McGuinness and Cowling 1975; Radfar 1985; Roberts and Samuelson 1988; Schmalensee 1972) to conclude that such effect is generally small and/or non significant. Among the most recent studies, the estimates by Nelson and Moran (1995) suggest that the main effect of alcohol advertising is to reallocate brand sales with small or no effect on total consumption.

Some attention has also been devoted to the impact upon aggregate demand of the advertising bans introduced in several countries. The results are surprising. Schneider et al. (1981) find that the 1971 US ban on broadcast advertising of tobacco products has *increased* consumption, an effect already predicted by Hamilton (1972) study (but see Baltagi and Levin 1986 for a different view). Stewart and Michael (1993) analyses data of tobacco consumption in OECD countries for the period 1964–1990. He estimates a model of per-capita tobacco consumption and finds that the dummy coefficient for the advertising bans introduced in six OECD countries is positive but not significant. Duffy (1996) survey of studies on advertising bans concludes that they are an ineffective policy instrument since they do not manage to reduce consumption.[1]

Even if the evidence that bans *increase* consumption is certainly not conclusive, the very possibility that an increase rather than a decrease of demand may follow the introduction of advertising restrictions is puzzling. The explanations given by the authors who have found a positive effect of a ban upon consumption either do not offer a general explanation or are not always convincing.

Hamilton (1972) work on the US suggests that this result is due to the fact that by banning broadcast advertising on cigarettes, the anti-smoking publicity has been reduced as well. Actually, the Fairness Doctrine obliged broadcasters to give a proportion of the time devoted to cigarette advertising to anti-smoking advertisers for them to air their health warnings (usually the proportion was roughly one third). Because of the banning of advertising by cigarette producers, the anti-smoking lobbies have lost the implicit subsidies which allowed their intensive campaigns about the danger of

[1] However, in some cases advertising bans do seem to reduce consumption. For instance, Dhar and Baylis (2011) find that a Quebec ban on fast-food advertising targeting children has reduced fast-food consumption.

tobacco consumption. Since Hamilton finds that anti-smoking publicity is more effective in reducing consumption than advertising in increasing it, a plausible explanation for the positive effect of the ban on aggregate demand in the US is given. However, this argument cannot be applied to countries where no Fairness Doctrine exists.

Schneider et al. (1981) suggest that the US broadcasting ban brought about a decrease in advertising expenditures of the firms, which in turn led to lower cigarette prices and to an increase in demand.

As far as I know, advertising bans have not attracted much attention from theoretical industrial organisation. An exception is Friedman (1983), who models advertising expenditures as a capital investment, with the stock of advertising determining the goodwill level of a firm, which in turn affects demand. He also explicitly accounts for the externalities that advertising by a firm can have on its rivals. In Friedman's model an advertising ban either decreases or leaves unchanged aggregate consumption, but it could never increase it. Doraszelski and Markovich (2007) also model advertising in a dynamic way, and they show that an advertising ban favours long-established brands (whose advertising stock is higher) to the detriment of recent entrants, thereby increasing market concentration. (They do not study the effect of the ban on total consumption.)

In a path-breaking paper, Dixit and Norman (1978) analyse the welfare effects of advertising within an oligopolistic model where firms choose advertising and output simultaneously.[2] They assume that advertising increases prices[3] and find that the sign of the impact of advertising upon consumption cannot be established a priori, a result consistent with the analysis in the present paper. However, they do not deal explicitly with advertising bans and their effects, nor does their analysis deal with the impact of advertising on firms' profits.

I show in this paper that two effects play a role in determining the impact of advertising (and advertising restrictions) on the total consumption of a given good. One effect is direct and I label it *expansion effect*. It determines the extent to which advertising attracts new consumers into the market (or expands demand of existing consumers) for any given prices. The other effect is indirect and I call it *price effect* of advertising. It measures how advertising impinges upon prices, for any given level of demand. In turn, the change in prices will affect demand.

When advertising decreases prices both effects have the same sign. Indeed, the expansion effect is non-negative, while the reduction in price caused by advertising would also increase demand. One can therefore conclude that a ban on advertising would unambiguously decrease aggregate consumption.

When advertising raises prices the net effect upon consumption is a priori ambiguous. The expansion effect is still non-negative, but the price effect works in the opposite direction. Advertising leads to an increase in prices—ceteris paribus—and via this channel it decreases demand. It is the relative magnitude of the two effects which

[2] They find that advertising is socially excessive. This is mainly because a firm decides on advertising expenditures by looking at its own profitability only and disregarding the possible negative externalities imposed upon rivals.

[3] In their model, the assumption that advertising decreases the firm's elasticity of demand guarantees that it raises equilibrium prices.

determines the net impact of advertising on consumption. In particular, one would expect a ban to decrease consumption when the expansion effect is small (advertising does not attract new consumers in the market) and when the price effect of advertising is strong (for instance, when advertising increases the perceived degree of product differentiation between competing products).

Since the distinction between price-decreasing and price-increasing advertising is crucial for the prediction of the effects of advertising regulations on consumption, it is useful to give examples of situations which can be associated to either case.

To illustrate price-reducing advertising, consider advertising messages—usually found in local newspapers, radios and televisions - which mainly inform consumers about the existence of sellers and the prices they charge. In this case, the main effect of advertising is to foster competition, since it allows comparative shopping and therefore tends to reduce perceived product differentiation created by lack of information (see for instance Grossman and Shapiro 1984). As a result, advertising would decrease prices, other things being equal, and indirectly increase consumption. Additionally, it might also have a direct positive effect on demand since it may lead new consumers, otherwise unaware of the goods, to buy them. Both the price and the market expansion effect act in the same direction, and an advertising ban would increase prices and decrease consumption.

There exists some evidence that the market for professional services fits this picture. Benham (1972) and Kwoka (1984) find that in the states of the US where advertising for eyeglasses or optometric visits is not allowed, prices for eyeglasses and visits are higher than in States where such restrictions do not exist. Similar results have been obtained by Schroeter et al. (1987) who look at advertising by attorneys and by Stephen and Frank (1994) who looks at the conveyancing fees charged by solicitors in Scotland before and after de-regulation of advertising in such field.

As for price-increasing advertising, consider instead advertising campaigns which do not provide information about prices but try to associate a certain image with a certain brand. This type of advertising increases brand recognition, enhances loyalty towards the firm's products and therefore increases product differentiation and allows firms to enjoy more market power. Hence, it raises equilibrium prices. This would in turn reduce consumption, unless advertising might also shift outwards the aggregate demand function for any given level of prices. A priori, therefore, the effect of price-increasing advertising upon total demand is ambiguous.[4]

I believe that advertising campaigns for goods such as cigarettes and alcoholic drinks, which usually refrain from price announcements and try instead to build a strong brand image, belong to the category of price-increasing advertising, a ban of which would have ambiguous effects on consumption.

The remainder of this paper is organised in the following way. In Sect. 2, I study the marginal effect upon demand of advertising expenditures, in a general oligopolistic model. The marginal analysis gives many insights as to the economics of advertising bans. In particular, it illustrates the role played by the price effect and the market

[4] The reader will have noticed that price-decreasing and price-increasing advertising share some similarities with informative and persuasive advertising. See Tirole and Jean (1988, Sect. 7.3). Doraszelski and Markovich (2007) prefer instead to distinguish between awareness and goodwill advertising.

expansion effect of advertising. However, it is not the most proper instrument to study the effects of a complete ban which implies discrete, rather than marginal, changes in the level of advertising made by the firms (aggregate demand might be a non-monotonic function of advertising). For this reason, in Sect. 3 I specialise the analysis and propose a new model which provides an illustration of the two effects mentioned above and an analysis of possible discrete changes in advertising levels. Additionally, the model allows to gain some insights on the likely effect of a ban on the profits of the firms in the industry and might therefore help explain the firms' attitude towards the imposition of a ban on advertising.[5]

In this model, advertising increases the degree of product differentiation and thus the price effect of advertising is quite strong. It turns out that there exists a critical threshold value of the expansion effect of advertising below which this effect is dominated by the price effect. In other words, the lower the direct impact of advertising upon demand and the more likely that the ban increases consumption via a price reduction caused by less product differentiation. Given that advertising has a key role in relaxing market competition and allowing firms to charge higher prices, an advertising ban has in general a negative effect upon firms' profits. Only in the rather extreme circumstances where firms are selling products which are ex-ante—that is, even in the absence of any advertising—highly differentiated (which implies that advertising is less useful to relax market competition) and where the expansion effect is extremely small (that is when advertising tends to attract only consumers which previously patronised rival products) does the ban increase firms' profits.

This paper suggests therefore that in sectors where advertising is done to increase brand recognition (that is, it is persuasive rather than informative), an advertising ban may have the effect of increasing, rather than decreasing, consumption. Similarly, the model can be interpreted to warn against some recent policy proposals which aim at imposing brand-less packing for cigarettes. The Australian government, for instance, is planning to ban logos and branding on tobacco packaging, with all products names written plainly and with small letters. This would have the effect of decreasing drastically product differentiation, reducing the firms' ability to charge high prices for their cigarettes. While the price decrease will certainly hurt producers,[6] it will probably have the effect of increasing rather than decreasing consumption, especially considering that cigarette advertising is already prohibited in Australia.

Section 4 concludes the paper with a discussion of the results obtained and of the assumptions made, as well as suggestions for a number of possible extensions.

2 Advertising and quantities: the general model

In this section, I analyse the marginal effects of advertising on aggregate demand. I assume that oligopolistic firms choose advertising levels in the first stage of the

[5] Since the impact of advertising restrictions is ambiguous only when advertising is of a price-increasing type, the specific example dealt with in Sect. 3 reproduces this feature.

[6] Not surprising, cigarette-makers do not like this plan. See e.g. "Philip Morris battles Australia on cigarette packaging", in BBC News/Business website (www.bbc.co.uk.uk/news/business-13923095), posted on 27 June 2011.

game, and prices in the second stage. This is to represent the idea that advertising is usually associated to a particular marketing strategy which is a longer-run variable than market decision variables such as pricing of products. The utility function of the representative consumer is given by:

$$U = y + \phi(q_1, \ldots, q_n; I_1, \ldots, I_n), \tag{1}$$

where y is a composite good, q_i is the i-th good whose market we want to study and I_i is the investment in advertising of the i-th good. From the maximisation of the utility of the consumer we obtain the following system of inverse demand functions:

$$p_i = \frac{\partial \phi(q_1, \ldots, q_n; I_1, \ldots, I_n)}{\partial q_i}, \qquad i = 1, \ldots, n. \tag{2}$$

We also assume that it is possible to invert this system so as to obtain the direct demand functions as follows:

$$q_i = f(p_1, \ldots, p_n; I_1, \ldots, I_n), \qquad i = 1, \ldots, n, \tag{3}$$

where $\partial q_i / \partial p_i < 0$.

I limit my attention to the case of demand substitutes, and therefore assume that $\partial q_i / \partial p_j > 0$, with $j \neq i$. Throughout the paper I also assume that $\partial q_i / \partial I_i \geq 0$, whereas $\partial q_i / \partial I_j$ can be either positive or negative.

Consider an oligopolistic industry with n firms whose demand schedules are given above. For simplicity, assume that the n products enter the demand function of consumers in a perfectly symmetric way, and that the firms have identical technologies. I assume away production costs for simplicity and without major consequences for the qualitative results. The only cost is given by advertising outlays. I also assume a convex advertising cost function $C(I_i)$ identical for all firms. These assumptions guarantee the existence of a symmetric equilibrium, on which I focus. At the first stage of the game, the profit function for the i-th firm is given by:

$$\Pi_i = p_i(\mathbf{I}) q_i(\mathbf{p}(\mathbf{I}), \mathbf{I}) - C(I_i), \tag{4}$$

where $p_i(\mathbf{I})$ is the equilibrium price for given vector of advertising levels, to express the fact that each firm anticipates the outcome of the product market stage of the game, and where $\mathbf{p}$ and $\mathbf{I}$ denote respectively the vector of prices and the vector of advertising levels. Using the envelope theorem, the first-order conditions of the profit-maximising problem of the firms are:

$$\frac{d\Pi_i}{dI_i} = p_i \left(\frac{\partial q_i}{\partial I_i} + \sum_{j \neq i} \frac{\partial q_i}{\partial p_j} \frac{\partial p_j}{\partial I_i} \right) - \frac{dC}{dI_i} = 0. \tag{5}$$

Note that a firm might advertise even when there is no direct effect on own demand ($\partial q_i / \partial I_i = 0$), provided that $\sum_{j \neq i} \frac{\partial q_i}{\partial p_j} \frac{\partial p_j}{\partial I_i} > 0$. This could be the case, for instance,

when advertising increases product differentiation, thus allowing firms to set higher prices.

Total demand for the industry is:

$$Q = \sum_{i=1}^{n} q_i \left(\mathbf{p}(\mathbf{I}), \mathbf{I}\right). \tag{6}$$

To find the total effect of advertising by firm i on aggregate consumption, let us study the sign of:

$$\frac{dQ}{dI_i} = \sum_{k=1}^{n} \left(\sum_{j=1}^{n} \frac{\partial q_k}{\partial p_j} \frac{\partial p_j}{\partial I_i} + \frac{\partial q_k}{\partial I_i} \right), \tag{7}$$

where the assumption of symmetry has been used. The overall impact of advertising on total consumption is given by two effects, represented by the two terms between brackets in the above expression. The first effect consists of the *price* (or indirect) effect of advertising. For any given level of aggregate demand, increasing the level of advertising affects equilibrium prices ($\sum_{j=1}^{n} \frac{\partial p_j}{\partial I_i}$) which in turn modifies demands for the goods ($\sum_{k=1}^{n} \frac{\partial q_k}{\partial p_j}$).

The second effect is given by the *expansion* (or direct) effect of advertising. It is reasonable to assume that, for any given level of prices, increasing the level of advertising affects industry demand non-negatively: $\sum_{j=1}^{n} \frac{\partial q_j}{\partial I_i} \geq 0$.[7]

Under the assumption that $\sum_{k=1}^{n} \frac{\partial q_k}{\partial p_j} < 0$ (own effect is stronger than cross effects), the effects of a marginal increase in advertising upon total consumption depend on which of the two following cases hold.

- If $\sum_{j=1}^{n} \frac{\partial p_j}{\partial I_i} \leq 0$, then $\frac{dQ}{dI_i} \geq 0$.
- If $\sum_{j=1}^{n} \frac{\partial p_j}{\partial I_i} > 0$, then the sign of $\frac{dQ}{dI_i}$ is indeterminate.

In the first case, advertising outlays decrease prices that firms can charge at equilibrium.[8] Hence, the price and the expansion effects upon market demand have the same sign: advertising unambiguously raises demand, and an advertising ban would decrease it.

The second case is more interesting, since advertising increases equilibrium prices, thus indirectly decreasing demand. This makes it impossible to tell a priori what is the effect of an advertising ban. Note that the larger the direct effect (that is the larger the expansion of market demand at given prices) and the lower the impact of

[7] I disregard the possibility that advertising decreases aggregate demand for given price levels. This might occur when a firm engages in advertising which emphasises negative features of rival products. Some consumers might cease to patronise the rival good without switching to the advertising firm's products.

[8] Note that it is natural to think that under persuasive advertising $\partial p_i / \partial I_i$ is positive, but the overall effect on other firms' prices will depend on the strategic interactions among firms.

advertising on prices for given demand, the more likely that advertising raises aggregate consumption.[9]

3 An example: advertising increases product differentiation

The analysis carried out in the previous section considers marginal changes of advertising, while an advertising ban involves discrete changes. Furthermore, it says very little about the effects that an advertising ban might have on the firms' profits. It has been suggested that the advertising game has often the features of a prisoners' dilemma game with the ban allowing the firms to reach a Pareto-superior outcome (see for instance Scherer 1980), although one can often observe that companies and trade associations are the main opponents of advertising bans. The impact of bans upon industry profits does not then seem obvious, and it deserves an investigation.[10] Likewise, one would also like to gain some insights about the difficult question of the welfare effects of an advertising ban in situations where the authorities do not just aim at reducing consumption but have a welfare function which gives a positive weight to consumer surplus and profits.

In this section I proceed to formulate a simple new model to deal with these issues. Since the results obtained in the framework of the more general model in Sect. 2 indicate that the more interesting case occurs when advertising raises prices, I propose a model which formalises this characteristic.

3.1 Demand and advertising functions

To keep the formalisation in the simplest possible terms, I focus on a duopoly example with single-product firms. The generalisation to n firms would be straightforward. The utility of the consumer is given by the following quadratic function in the style of Shubik and Levitan (1980) and Singh and Vives (1984):

$$U = y + a(q_1 + q_2) - b_1\frac{q_1^2}{2} - b_2\frac{q_2^2}{2} - gq_1q_2, \tag{8}$$

where the parameters $b_1 b_2$ and g are affected by advertising as described below. The inverse demand functions are therefore:

$$p_i = a - b_i q_i - gq_j, \qquad a > 0; \quad b_i > g > 0; \quad i, j = 1, 2; i \neq j. \tag{9}$$

[9] The working paper version of this paper (Motta 1997) shows that it is less likely that aggregate consumption decreases with advertising (that is, it is less likely that a ban raises total demand) when products are sold by a monopolist than when they are sold by oligopolistic firms. This is because the latter would not internalise the negative externality that advertising might impose on other firms' demands. This point had already been noted by Dixit and Norman (1978).

[10] Throughout the paper I assume that a ban is obeyed. For instance, firms cannot circumvent the ban on advertising by resorting to sponsorship of sports events. To see that this assumption is reasonable, consider that in many OECD countries, both direct and indirect advertising of tobacco products are outlawed.

From which one can obtain the direct demand functions:

$$q_i = \frac{a(b_j - g) - b_j p_i + g p_j}{b_i b_j - g^2}, \qquad i, j = 1, 2; i \neq j. \tag{10}$$

Note that at a symmetric equilibrium ($b_i = b_j$; $p_i = p_j$) aggregate demand would be written as:

$$Q = q_1 + q_2 = \frac{2(a - p_i)}{b_i + g}. \tag{11}$$

The analysis in the previous section has shown that the extent to which advertising outlays increase aggregate demand for any given price level (the "expansion effect") is crucial for the determination of the effect of advertising bans upon consumption. Hence, one would like to have a parameter which measures such an effect. To do so, assume that advertising outlays I_i affect the demand parameters in the following way:[11]

$$b_i = \bar{b} + lI_j; \quad g = \bar{g} - I_i - I_j; \quad I_i < \bar{g}/2; \quad l \in [0, 2]; \quad i, j = 1, 2; i \neq j. \tag{12}$$

In the symmetric case $I_i = I_j = I$ the impact of an increase of the common level of advertising on aggregate demand at given prices is given by:

$$\frac{\partial Q}{\partial I} = \frac{2(a - p_i)(2 - l)}{(\bar{b} + \bar{g} + lI - 2I)^2} \geq 0. \tag{13}$$

The parameter l is therefore an inverse measure of the "expansion effect" of advertising upon aggregate consumption, since $\frac{\partial Q}{\partial I}$ is decreasing with l. When $l = 0$, advertising expenditures give rise to the maximum expansion of market demand. When $l = 2$, such an effect is completely absent. In this extreme case, advertising has the effect of increasing the degree of product differentiation without modifying the demand of consumers at given prices (of course, market demand can still be indirectly affected via price changes).[12]

Note also the particular way in which advertising modifies own and rival firm's demand. Advertising by firm i shifts outwards own demand $p_i = a - b_i q_i - g q_j$ as g decreases. It also affects firm j's demand, which shifts outwards because of the reduction of g but which also rotates inwards around its intercept because of the increase in parameter b_j. The magnitude of the latter effect depends on the parameter l. The higher l the more important the inward rotation in firm j's demand associated to a given outward shift in firm i's demand. Accordingly, higher values of l entail a lower expansion of aggregate demand.

[11] If b_i was specified as a function of the competitor's advertising, advertising would have no business-stealing effect. See also Sect. 3.4 below for a discussion.

[12] See also Sect. 3.4 for two different specifications of the way in which advertising might affect utility and demand functions in the same class of models.

Note however that advertising always contains an element of positive externality to the other firm, since advertising reduces the parameter g and increases the parameter b_j, thus increasing the index of product differentiation which is given by $PD = \frac{b_i b_j}{g^2}$ and raising prices for both firms.[13,14] Therefore, $(\bar{b}/\bar{g})^2$ denotes the ex-ante degree of product differentiation, that is differentiation in the absence of any advertising.

Note also that advertising by a firm tends to decrease the elasticity of demand of both firms around a symmetric equilibrium. Indeed, it can be checked that for $p_1 = p_2 = p$ and $I_1 = I_2 = I$:

$$\frac{\partial \epsilon_i}{\partial I_i} = \frac{-(\bar{b} + \bar{g}l - lI)p}{(\bar{b} - \bar{g} + 2I + lI)^2(a - p)} < 0;$$

$$\frac{\partial \epsilon_i}{\partial I_j} = \frac{-(\bar{b} + lI)p}{(\bar{b} - \bar{g} + 2I + lI)^2(a - p)} < 0. \tag{14}$$

The fact that advertising by a firm reduces the elasticity of demand of the rival mainly depends on the increase in product differentiation caused by advertising. Owing to the increase in product differentiation, advertising always increases prices. Indeed, the term $\frac{\partial p_i}{\partial I_i} + \frac{\partial p_j}{\partial I_i}$ which determines the sign of the price effect of advertising is always positive whatever the level of the parameter l.

3.2 The game

Firms play a two-stage game. In the first period they simultaneously choose the levels of advertising. In the second period, they simultaneously choose prices. We look for the sub-game perfect Nash equilibrium.

It is straightforward to compute the equilibrium prices, quantities and profits at the last stage of the game as follows:

$$p_i^* = \frac{a(2b_i b_j - b_i g - g^2)}{4b_i b_j - g^2}; \tag{15}$$

$$q_i^* = \frac{a b_j (2b_i b_j - b_i g - g^2)}{(b_i b_j - g^2)(4b_i b_j - g^2)}; \tag{16}$$

[13] Note that in the standard Hotelling model of product differentiation it would be impossible to carry out the same analysis I am doing here, since demand is perfectly inelastic to prices and market demand is given. In a model of this type (see for instance von der Fehr and Stevik 1995) I would not be able to identify a parameter which measures the (direct) expansion of market demand caused by advertising, nor could I account for the indirect effect on demand via prices.

[14] To my knowledge, the most similar treatments to the one proposed here are to be found in Cabrales and Motta (2001) and Rosenkranz (2003). In both papers, firms invest to diminish the parameter g, giving rise to a pure externality effect. The main difference is that here advertising also affects the parameter b_j, which allows me to control for the expansion effect of demand. See also Vives (1990) for investments which modify demand parameters in the linear demand model.

$$\Pi_i^* = \frac{a^2 b_j (2b_i b_j - b_i g - g^2)^2}{(b_i b_j - g^2)(4b_i b_j - g^2)^2}; \qquad i, j = 1, 2; i \neq j, \tag{17}$$

where $b_i b_j$ and g are functions of advertising levels I_i and I_j as assumed above.

Denote $dC(I_i)/dI_i$ as $C'(I_i)$. The equilibrium of the whole game is found by solving $d\Pi_i^*/dI_i = C'(I_i)$. To obtain internal solutions in the interval $I \in [0, \bar{g}/2)$,I assume that the advertising cost function has the following properties: $C'(I_i) \geq 0$; $C'(0) = 0$; $C(0) = 0$; $\lim_{I_i \to \bar{g}/2} C(I_i) = \infty$; $\lim_{I_i \to \bar{g}/2} C'(I_i) = \infty$.

Before characterising the equilibrium, however, let us study the aggregate quantity sold in the market. By focusing on the symmetric case $I_i = I_j = I$ and $b_i = b_j = b$ and substituting p_i^* in the expression of total consumption one obtains:

$$Q(I) = \frac{2ab}{(b+g)(2b-g)} = \frac{2a(\bar{b} + lI)}{(\bar{b} + \bar{g} + I(l-2))(2\bar{b} - \bar{g} + 2I(l+1))}. \tag{18}$$

Since our objective is to study whether an advertising ban reduces or increases aggregate consumption, it is useful to define the function $\Delta Q \equiv Q(I) - Q(0)$, where $Q(0) = 2a\bar{b}/((\bar{b} + \bar{g})(2\bar{b} - \bar{g}))$ is the total quantity sold under a complete advertising ban.

The sign of ΔQ is crucial to understand the effect of a ban upon consumption. To study its sign, write the value of I which solves $\Delta Q = 0$ as:

$$I_{\Delta Q=0} = \frac{2\bar{b}^2(l-1) + \bar{g}(4\bar{b} + \bar{g}l)}{2\bar{b}(2 + l - l^2)}. \tag{19}$$

It is straightforward to check the following:

- *Remark 1* At $l = 0$, $I_{\Delta Q=0} = -(\bar{b} - 2\bar{g})$, which is non-negative for $\bar{b} \leq 2\bar{g}$.
- *Remark 2* As l approaches $2 I_{\Delta Q=0} \to \infty$.
- *Remark 3* The function $I_{\Delta Q=0}$ is increasing in the space (l, I), since: $\frac{\partial I_{\Delta Q=0}}{\partial l} = \frac{6\bar{b}^2 - 4\bar{b}\bar{g} + 2\bar{g}^2 - 4\bar{b}^2 l + 8\bar{b}\bar{g}l + 2\bar{b}l^2 + \bar{g}^2 l^2}{2\bar{b}(2+l-l^2)^2} > 0$.
- *Remark 4* In the space (l, I) the function $I_{\Delta Q=0}$ shifts to the right when $\bar{b}$ increases and when $\bar{g}$ decreases.
  Indeed: $\frac{\partial I_{\Delta Q=0}}{\partial \bar{b}} = -\frac{2\bar{b}^2(1-l) + \bar{g}^2 l}{2\bar{b}^2(2+l-l^2)}$ is negative on all the relevant domain, since the function $I_{\Delta Q=0}$ makes sense only for $l \in [0, 1 - \frac{\bar{g}}{\bar{b}})$. Outside this interval, a firm's advertising expenditures I would exceed $\bar{g}/2$, which is excluded by assumption.
  Also: $\frac{\partial I_{\Delta Q=0}}{\partial \bar{g}} = -\frac{2\bar{b} + \bar{g}l}{\bar{b}^2(2+l-l^2)} > 0$.

The curve $I_{\Delta Q=0}$ is drawn in Fig. 1 for given values of the parameters $\bar{b}$ and $\bar{g}$. The figure also shows that higher (lower) values of $\bar{b}$ ($\bar{g}$) holding fixed the other parameter would shift the curve to the right.

This figure helps us understand the effects of a ban. Imagine for instance that the equilibrium value I^* lies to the right of the curve $I_{\Delta Q=0}$. This would imply that $Q(I^*) < Q(0)$. In other words, the ban would increase aggregate consumption. One can then apply the same argument to interpret Remarks 1 and 2 above.

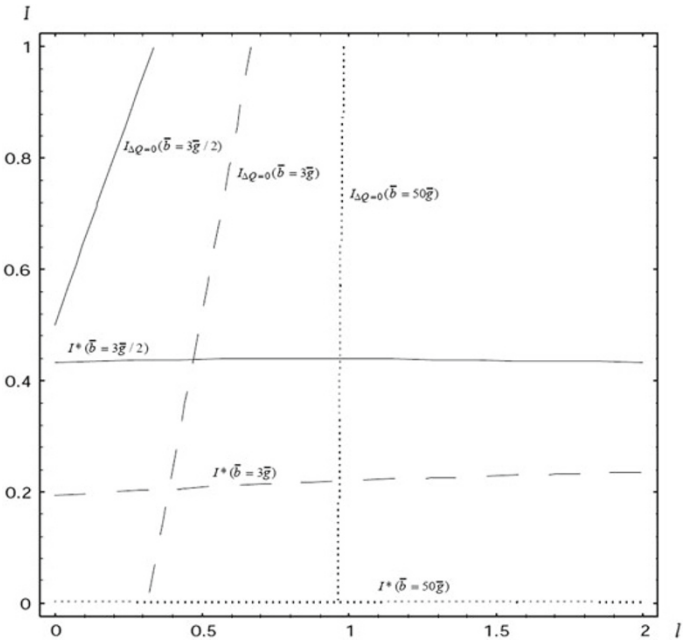

Fig. 1 Effect of the ban on aggregate quantity

Remark 2 tells us that no matter which equilibrium level of advertising occurs when $l = 2$, that is when advertising does not have any effect on aggregate consumption for given price levels, an advertising ban would always *increase* aggregate consumption. This is because whatever I^* will always fall in the area where the inequality $Q(I^*) < Q(0)$ holds.

Remark 1 is of less straightforward interpretation, since the position of the curve at $l = 0$ depends on the values of the parameters $\bar{b}$ and $\bar{g}$. We can identify two cases:

- $\bar{b} > 2\bar{g}$.
  In this case the equilibrium level of advertising $I^* > 0$ would always fall in an area where $Q(I^*) > Q(0)$. Hence, an advertising ban would certainly *reduce* consumption.
- $\bar{b} \leq 2\bar{g}$.
  Here we have two possibilities: either the actual equilibrium value I^* lies above the curve $I_{\Delta Q=0}$, in which case a ban reduces aggregate consumption; or it lies below the curve, in which case a ban increases aggregate consumption. This uncertainty can be resolved only by finding the actual equilibrium value I^*.[15]

The previous analysis confirms the role played by the direct effect of advertising on market demand expansion (inversely related to the parameter l) in determining the sign an advertising ban has upon aggregate consumption. As a first result, we have

[15] However, note that for $\bar{b} \to \bar{g}$ one has $I_{\Delta Q=0} \to \bar{g}/2$. This means that when goods are ex-ante homogenous the locus of the equilibrium levels of advertising will always lie below the curve $I_{\Delta Q=0}$.

seen that when l is large enough (that is, when the expansion effect of advertising is weak enough) an advertising ban increases consumption, a finding which confirms the results obtained in Sect. 2. To complete our analysis, let us turn to the study of equilibrium advertising expenditures.

3.3 Specifying the cost function: equilibrium solutions

To find the solutions of the whole game I assume the following cost function:

$$C(I_i) = k\left(-\frac{1}{\bar{g}/2} + \frac{1}{(\bar{g}/2) - I_i} - \frac{I_i}{(\bar{g}/2)^2}\right), \qquad k \geq 0. \tag{20}$$

This function satisfies the properties required above for getting interior solutions in the interval $0 \leq I_i < \bar{g}/2$.

With such a cost function (but also with other simpler convex functions) solutions can be found only with the help of a computer programme. Figure 1 illustrates the symmetric equilibrium I^* as a function of l. The curves have been drawn for values of $\bar{b}$ as specified in the figure, and for the following values of the parameters: $\bar{g} = 2$ (so that advertising expenditures are normalised to be between 0 and 1), $k = 1a = 10$. I hold these values fixed for all the numerical solutions without any major loss for the analysis. Indeed, $\bar{g}$ affects the results only when it changes with respect to $\bar{b}$, so that the effect of a decrease in $\bar{g}$ upon the equilibrium solutions is identical to the effect of an increase in $\bar{b}$. The parameter k enters in a multiplicative way in the cost function, and its effect on the equilibrium level of advertising is therefore straightforward: when k rises, marginal costs of advertising also rise, and the locus of the equilibrium points shifts downwards. As for parameter a, it enters in a multiplicative way in the gross profit function. An increase in a would therefore shift the equilibrium locus upwards.

A priori, it is not clear what is the effect of an increase in l upon the equilibrium values of advertising. On the one hand, an increase in l means that fewer new consumers are attracted into the market, which lowers the incentive to spend in advertising. On the other hand, l is also a measure of the negative externality imposed upon the rival firm. Other things being equal, a higher l means that an additional unit of advertising expenditures entails a wider inward rotation of the demand curve of the rival. This creates a stronger incentive to advertise since it increases profitability. This ambiguity is reflected in the fact that I^* is negatively sloped for ex-ante more similar goods ($\bar{b}$ closer to $\bar{g}$) but positively sloped when goods are already highly differentiated in the absence of advertising.

An increase in $\bar{b}$ makes the curve shifts downwards. This is because for any given $\bar{g}$, a higher $\bar{b}$ implies a rise in the "ex-ante" index of product differentiation (i.e. the degree to which products are differentiated when advertising does not exist). In turn, this reduces the incentive to increase product differentiation and therefore lowers the optimal value of advertising outlays. Likewise, when $\bar{g}$ decreases with respect to $\bar{b}$, this increases ex-ante differentiation and creates less incentive to spend in advertising to further differentiate the competing brands.

This result clearly contrasts with the well-known Dorfman and Steiner (1954) theorem, according to which advertising increases with the firm's market power. Here it is the opposite, since firms advertise precisely to increase their market power, and such an incentive is the stronger the lower the market power they have (that is, the more homogenous the goods ex-ante).[16]

The intersection between the curves I^* and $I_{\Delta Q=0}$, which occurs at $l = \tilde{l}$ (see Fig. 1, where for simplicity $\tilde{l}$ has been drawn only for the case where $\bar{b} = 3\bar{g}$) is crucial:

- If $\tilde{l} < 0$, a complete advertising ban increases aggregate consumption $\forall l$.
- If $\tilde{l} \geq 0$, then:
  - For $l \in [0, \tilde{l}]$ a complete ban decreases aggregate consumption.
  - For $l \in (\tilde{l}, 2]$ a complete ban increases aggregate consumption.

Indeed, for $l \in [0, \tilde{l}]$, the equilibrium level of advertising lies above the curve $I_{\Delta Q=0}$, implying that $Q(I^*)$ is bigger than $Q(0)$. That is, the total quantity sold at the unconstrained equilibrium is larger than is the total quantity sold under a ban on advertising. For $l \in (\tilde{l}, 2]$, the opposite happens.

Figure 1 also illustrates that when the ex-ante degree of product differentiation rises ($\bar{b}$ increases with respect to $\bar{g}$), the intersection between the two curves moves to the right. This means that it is less likely that an advertising ban has the undesired effect of increasing total consumption when products are ex-ante differentiated. Instead, products whose different brands are hardly distinguishable in the absence of labeling and brand-name fidelity are more likely than others to be associated with a rise in consumption after an advertising ban. In other words, the less differentiated are the products ex-ante the stronger the price effect of advertising. In turn, the more likely that the prohibition of advertising increases consumption.[17]

The effect of the ban on profits

To find the effect of the bans on profits, I follow a similar procedure as the one used to uncover the effect on consumption. Define the function $\Delta\pi \equiv \pi(I) - \pi(0)$, where $\pi(I)$ is a firm's profit at a symmetric level of advertising expenditures and $\pi(0)$ a firm's profit under a ban. By substitution into the second stage profit, this function can be written:

$$\Delta\pi = \frac{a^2(\bar{b} + lI)(\bar{b} - \bar{g} + I + lI)}{(2\bar{b} - \bar{g} + 2I + 2lI)^2(\bar{b} + \bar{g} - 2I + lI)} - \frac{8kI^2}{\bar{g}^2(\bar{g} - 2I)} - \frac{a^2\bar{b}(\bar{b} - \bar{g})}{4\bar{b}^3 - 3\bar{b}\bar{g}^2 + \bar{g}^3}. \tag{21}$$

[16] See also Becker and Murphy (1988) for a critique of the Dorfman–Steiner's theorem.

[17] Cigarettes and colas would probably be good examples of "ex-ante" homogenous products. Results of blind-tests for these goods usually show that consumers are unable to make out their favourite brand from rival ones.

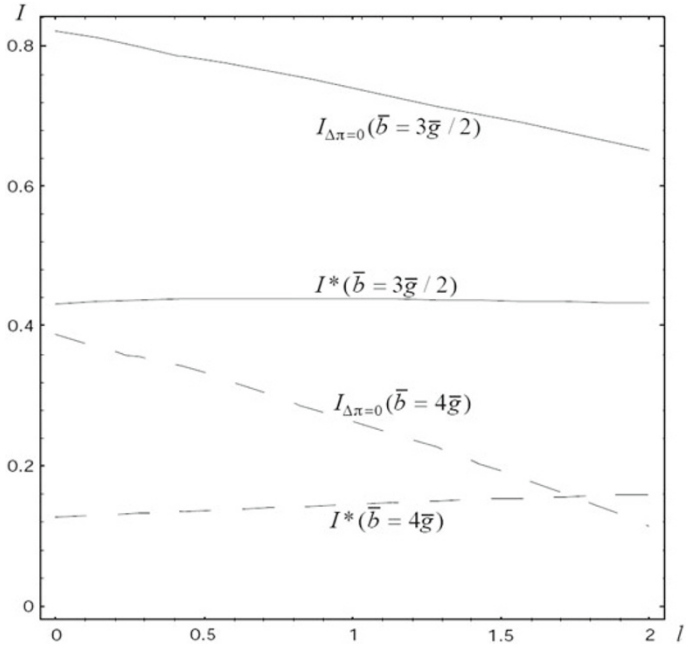

Fig. 2 Effect of the ban on profits

Figure 2 draws the function $I_{\Delta\pi=0}$ in the space (l, I). Below the curve, $\pi(I)$ is higher than $\pi(0)$. Above it, the opposite. The same figure also shows the locus I^* of the equilibrium solutions of the game. For low values of $\bar{b}$ with respect to $\bar{g}$, the curve $I_{\Delta\pi=0}$ lies above the equilibrium schedule, implying that firms are always worse off under an advertising ban. It is only when $\bar{b}$ becomes very high relative to $\bar{g}$ that the ban might give higher profits to the firms. However, this occurs only for relatively high values of l, that is when the expansion effect is low enough. Said otherwise, an advertising ban might be beneficial to the firms only if they produce goods which are already highly ex-ante differentiated *and* if advertising expenditures are not likely to increase aggregate demand but rather to shift consumers across firms.

The intuition for this result is as follows. Advertising in this model plays a twofold role. First, it relaxes market competition between firms. Second, it increases aggregate demand at given prices. When products are already highly differentiated, there is little benefit from advertising as a way to relax market competition. When aggregate demand reacts little to advertising, advertising expenditures are collectively damaging. The combination of these two elements gives the result above.

I believe that this model illustrates the current views of practitioners about advertising bans. Indeed, the most widespread view in tobacco firms seems to be that an advertising ban would lead to a price war, thus hurting the firms but at the same time increasing consumption. In a recent interview, a Philip Morris' manager has been quoted to say: "Like most consumer goods, cigarettes are marketed on image...If you take away that marketing tool, take away the manufacturer's ability to compete

on image, then price will become the main factor in seizing market share".[18] In a less colourful way one might rationalise these views by saying that an advertising ban would prevent firms from creating perceived product differentiation thus making them unable to keep high prices, which in turn might stimulate aggregate demand. This outcome is captured by the example I have proposed.

Welfare effects

When focusing on the effects of an advertising ban on total consumption, I have been implicitly assuming that reduction of consumption is the main objective of a government, as is often the case in reality. This can be rationalised by assuming that negative externalities due to consumption of the product carry most of the weight in a welfare function such as: $W = (1-\theta)(CS+PS) - \theta Q^2$, where $\theta \in [0,1]$ would be the weight the government gives to the externality function.

When a government attaches most of the weight in the welfare function to the externalities created by consumption, then the question of whether the ban increases welfare tends to coincide with the question of whether the ban manages to reduce consumption, which is precisely the main question I address in this paper.

When the government does not care only about externalities the welfare effects of the ban depend on its impact not only on consumer surplus (recall also that advertising directly affects the parameters of the demand function) but also on profits and externalities, and the analysis gets much more complex. In the simple case where the government does not attach any importance to the existence of externalities of consumption, we have seen that an advertising ban might increase welfare precisely because it has the effect of increasing (instead of decreasing) demand for the good. This is the more likely to occur the stronger the price effect and the weaker the expansion effect of advertising.

3.4 Other possible examples

The parametric model presented above was chosen mainly to illustrate the effects put in evidence in the general framework studied in section 2. Many other specific models can be studied, but I believe that the results obtained under alternative specifications can still be understood in terms of the price and market expansion effects. Let me briefly discuss two other possible examples which have somehow extreme alternative features.

A first alternative model can be obtained by adopting a slightly different variant of the example considered above. If advertising expenditures affected demand parameters as $b_i = \bar{b} + lI_i$, then the business-stealing effect of advertising would completely disappear, and the positive price externality would be dominant. This formulation would make the model similar to a Hotelling-type model where investments by a firm to move away from a central location would impart a double positive externality on

[18] See Rawstorne (1990).

the rival: first because it relaxes price competition, and then because it gives it a larger captive market. The "price effect" in such a model would be even stronger. Under this specification, it is possible to show that the ban increases consumption under similar conditions as those found in the previous model. However, the firms' profits would never increase under the ban, a result which is not surprising given the strong (positive) effect that advertising outlays have upon prices.

In Motta (1997) I consider a rather different model where I reproduce few essential features of a richer model due to Friedman (1983). In this model, advertising raises the willingness to pay of consumers without affecting the degree of product differentiation between goods. To keep the example as close as possible to the previous ones, assume that consumers have the following utility function: $U = y + a_1 q_1 + a_2 q_2 - b(q_1^2/2 + q_2^2/2) - g q_1 q_2$. This gives rise to the inverse demand functions $p_i = a_i - b q_i - g q_j$, and direct demand functions:

$$q_i = \frac{a_i b - a_j g - b p_i + g p_j}{b^2 - g^2}, \qquad a_i > 0; b > g > 0; \qquad i, j = 1, 2; i \neq j. \tag{22}$$

Assume that advertising expenditures affect demand parameters as follows:

$$a_i = \bar{a} + I_i + e I_j; \quad e \in [-1, 1]; \quad i, j = 1, 2; \quad i \neq j. \tag{23}$$

In the symmetric case $I_i = I_j = I$ the parameter e is a direct measure of the "expansion effect" of advertising upon aggregate consumption, since $\partial Q/\partial I = (1 + e)/(\bar{b}^2 - \bar{g}^2) \geq 0$.

By assuming the cubic cost function of advertising $C_i = k I_i^3/3$, the usual two-stage game where firms first simultaneously decide advertising expenditures and then prices can be fully solved and analytic solutions can be easily found.[19]

The main result is that—like in Friedman (1983) but unlike the examples analysed above—an advertising ban never increases consumption.[20] The main intuition for this result comes from the fact that advertising increases the consumers' willingness to pay for the good advertised but does not modify the degree of product differentiation between the competing goods.[21] As a result, the price effect of advertising is less strong than in the previous model and it never dominates the expansion effect. Furthermore, the model shows the very special feature that when the expansion effect decreases, so does the price effect.

Yet, the magnitude of the expansion effect still plays an important role, since the fewer new consumers are attracted into the market by advertising the less effective the ban in reducing aggregate consumption. In the extreme case where advertising just shifts consumers among firms without attracting new demand, the ban does not

[19] See Motta (1997) for details.

[20] Another difference with respect to the other models examined above is that the Dorfman–Steiner's condition holds good here. Exogenously given product differentiation raises the marginal revenue from advertising, thus increasing the incentive to engage in such expenditures.

[21] In this specification, the index of product differentiation is given by b^2/g^2, which is not affected by advertising.

change total consumption at all. This confirms the importance of the role played by the expansion effect of advertising.

The impact of the ban upon firms' profits depends on the expansion effect as well, like in the other model previously analysed. The stronger the negative externality imposed by a firm's advertising on rival firm's demand the more likely that the ban results in higher profits for the firms.

4 Conclusions

The main objective of this paper has been to analyse the impact of an advertising ban on total consumption. A general model has showed that two effects are crucial in determining such an impact. The first effect relates to the extent to which advertising expands aggregate demand at given prices. The second consists of the way in which advertising affects prices for any given level of demand. In particular, an advertising ban is more likely to *increase* total consumption when advertising expenditures do not expand the total market and when prices increase in a considerable manner due to advertising. If advertising decreased prices (as might be the case when firms engage in advertising which makes comparative shopping easier) a ban would always decrease consumption.

I have then proceeded to illustrate these main findings with the help of a model which has also allowed me to discuss the effects of an advertising ban upon the profits of the firms. I have showed that a ban is the more likely to increase firms' profits the weaker the expansion effect and the weaker the price effect of advertising. Although I believe that these findings would prove robust to possible alternative specifications, there are a number of features in this paper which are admittedly special and which deserve some comments.

- *Entry* Throughout the paper I have considered only the case of an exogenously given number of firms.[22] However, one might be interested in studying how the ban affects the number of firms which would coexist in the industry at equilibrium. In general, I would expect the answer to depend on a number of variables, among which the relative importance of the expansion and price effects mentioned above. Dixit and Norman (1978) have found that it is not possible to establish a priori whether more advertising allows more or fewer firms to operate in the industry, whereas Doraszelski and Markovich (2007) find in their model that advertising bans increases concentration because it makes it more difficult for recent entrants to establish their brand image, a result which receives some empirical confirmation in Clark (2007), which finds that an advertising ban in Quebec has increased market shares of long-established firms.
- *Asymmetry* I have not departed from the assumption of symmetry, which is very convenient but also very strong. Again, I feel that many insights would still apply to a situation where firms differ in their technologies and initial market positions. However, there are a number of interesting issues which arise under asymmetry

[22] In the models of Sect. 3 I have analysed a duopoly but the results carry over to a number n of oligopolists without difficulties.

and which only an accurate analysis might properly address. In particular, it would be interesting to understand which kind of firms is more likely (if at all) to benefit from the introduction of a ban. An interesting application could be given by the tobacco industry in the European Union. In many countries tobacco has been heavily regulated and state monopolies have existed for a long time. If outsiders can gain market shares mostly or uniquely through advertising, and if big multinationals are more efficient in their advertising activities than the local monopolies (in terms of the models above, the incumbent would have a higher advertising cost parameter k than the entrants), then the ban would protect the state monopolies (insiders) and hurt the big multinational firms (outsiders).[23]

- *Quantity competition* In the paper I have focused on price competition, both in the general model and in the specific examples. This allowed me to illustrate the expansion and price effects of advertising more neatly. None the less, the basic insights of the analysis can be reproduced in a model where the firms' strategic variable at the product market competition stage is quantity rather than price. Although I do not reproduce them for shortness, it is easy to check that the qualitative results obtained in the models proposed in Sect. 3 still hold good under the hypothesis of quantity competition.[24] Furthermore, there would have been no reason to suspect that the mode of market competition sensitively affects the result. Indeed, Dixit and Norman (1978) find that advertising does not necessarily increase quantity in a model where firms compete on quantities.
- *Partial equilibrium* By focusing on a partial equilibrium model, I cannot capture the effects of a ban on other sectors. In particular, some commentators (and lobbyists) claim that a ban would have the strongest effects upon newspapers, radio and television channels whose revenues are highly dependent on the advertising space sold to the firms. Neither this, nor other general equilibrium effects can be captured in the framework of analysis proposed here.
- *Advertising as capital assets* Advertising expenditures can be seen as investments which contribute to create a stock of goodwill (see Friedman 1983; Roberts and Samuelson 1988; Doraszelski and Markovich 2007). Within this perspective, an advertising ban would not have an immediate effect upon consumption and profits, since the willingness to pay of consumers would decrease only over time. This should obviously be taken into account in an empirical work on the effects of a ban. Although the paper does not account for the delayed impact of a ban, it does capture the long-run effects of it. The formulation proposed here would be equivalent to the comparative statics between long-run equilibria in a more sophisticated model where advertising acts as a capital asset.
- *Different age groups* For many products such as tobacco and alcohol advertising is often directed towards young people who are not usual consumers. One might want

[23] This argument has been suggested by commentators who noted that strict bans were enforced in Portugal, Italy and France, where state monopolies are strong. This might also imply that the true government objective would not be a decrease in consumption, but a welfare function where profits of national firms have a considerable weight.

[24] Details are available from the author upon request. One of the advantages of the models presented above is that it is possible to analyse both price and quantity competition, a property not always shared by many models of product differentiation.

to analyse the different impact of advertising on different age groups, by assuming that there are two generations of consumers, one which has already consumed the good in the past and is "addicted" to it; and a second generation which has never consumed the product. Some of these effects might be partly captured by the model presented here. In particular, the magnitude of the expansion effect is related to the importance of the generation of "new" consumers. However, the full consequences of such a framework of analysis could be properly investigated only within a model where the existence of two different generations is rigorously formalised. In particular, one could think of extending the model of rational addiction proposed by Becker and Murphy (1988) and tested by Becker et al. (1994) to study the effects of advertising on consumption. The price and expansion effects of advertising might be analysed in that richer framework of analysis.

- *Taxes and other instruments* My analysis has been restrictive in that I have considered just one of the many instruments available to a government which wants to reduce consumption. For instance, a consumption tax increase might be the best instrument to meet such a goal. However, higher taxes often encourage contraband. Insofar as smuggling from neighbouring countries might be increased by a tax level beyond a certain threshold, it is possible that this introduces cheaper units of the good in the market, thus countering the reduction in consumption. A completely different model than the one proposed here would be needed to deal with these issues. Even resorting to total prohibition of a given good might not be a straightforward way to reduce externalities associated with consumption. First, prohibition might stimulate the existence of a parallel market on which the authorities have little control, increase the use of violence, and encourage the production of poor quality substitutes which are more harmful than the good whose consumption one wants to reduce. Second, it is not clear that outlawing a certain good would be an effective tool to reduce consumption. Dills et al. (2005) finds empirical evidence that alcohol prohibition in the US might even have increased alcohol consumption. A possible explanation for such a result is that prohibition might actually decrease prices. A producer which operates in the black market and violates the law will have a lower marginal cost of evading all regulation and taxes. Hence, costs and prices might actually fall. These are all interesting issues which should be analysed in a formal framework.

References

Baltagi BH, Levin D (1986) Estimating dynamic demand for cigarettes using panel data: the effects of the bootlegging, taxation and advertising reconsidered. Rev Econ Statictics 6:148–155

Becker GS, Grossman M, Murphy KM (1994) An empirical analysis of cigarette addiction. Am Econ Rev 84(3):396–418

Becker GS, Murphy KM (1988) A theory of rational addiction. J Political Econ 96(4):675–700

Becker GS, Murphy KM (1993) A simple theory of advertising as a good or bad. Quart J Econ 108:941–964

Benham L (1972) The effect of advertising on the price of eyeglasses. J Law Econ 15:337–352

Cabrales A, Motta M (2001) Country asymmetries, endogenous product choice and the timing of trade liberalisation. Eur Econ Rev 45(1):87–107
Clark CR (2007) Advertising restrictions and competition in the children's breakfast cereal industry. J Law Econ 50(4):757–780
Dhar T, Baylis K (2011) Fast-food consumption and the ban on advertising targeting children: the Quebec experience. J Mark Res 48(5):799–813
Dills AK, Jacobson M, Miron JA (2005) The effect of alcohol prohibition on alcohol consumption: evidence from drunkenness arrests. Econ Lett 86(2):279–284
Dixit A, Norman V (1978) Advertising and welfare. Bell J Econ 9:1–17
Doraszelski U, Markovich S (2007) Advertising dynamics and competitive advantage. RAND J Econ 38(3):557–592
Dorfman R, Steiner PO (1954) Optimal advertising and optimal quality. Am Econ Rev 44:826–836
Duffy M (1996) Econometric studies of advertising, advertising restrictions and cigarette demand: A survey. Int J Advert 15:1–23
Friedman JW (1983) Advertising and oligopolistic equilibrium. Bell J Econ 14:464–473
Grossman GM, Shapiro C (1984) Informative advertising with differentiated products. Rev Econ Stud 51:63–81
Hamilton JL (1972) The demand for cigarettes: advertising, the health scare, and the cigarette advertising ban. Rev Econ Stat 54:401–411
Johnston J (1980) Advertising and the aggregate demand for cigarettes: a comment. Eur Econ Rev 14:117–125
Kwoka J (1984) Advertising and the price and quality of optometric services. Am Econ Rev 74:211–216
McGuinness T, Cowling K (1975) Advertising and the aggregate demand for cigarettes. Eur Econ Rev 6:311–328
Motta M (1997) Advertising bans. Universitat Pompeu Fabra Working Paper No. 205
Nelson JP, Moran JR (1995) Advertising and US alcoholic beverage demand: System-wide estimates. Appl Econ 27:1225–1236
Radfar M (1985) The effect of advertising on total consumption of cigarettes in the UK. Eur Econ Rev 29:225–231
Rawstorne P (1990) Cigarette makers now look to enhanced big brand fire power Financial Times 26 April cited in McGuinness T (1995) Advertising bans and product demand: how does marketing affect demand for a differentiated product? Int Rev Appl Econ 9(3):291–304
Roberts MJ, Samuelson L (1988) An empirical analysis of dynamic, nonprice competition in an oligopolistic industry. RAND J Econ 19(2):200–220
Rosenkranz S (2003) Simultaneous choice of process and product innovation when consuemrs have a preference for product variety. J Econ Behav Organ 50(2):183–201
Scherer F (1980) Industrial market structure and economic performance Chicago. Rand-McNally, Markham
Schmalensee R (1972) The economics of advertising. North-Holland, Amsterdam
Schneider L, Klein B, Murphy KM (1981) Governmental regulation of cigarette health information. J Law Econ 24:575–612
Schroeter JR, Smith SL, Cox SR (1987) Advertising and competition in routine legal services markets. J Ind Econ 36:49–60
Shubik M, Levitan R (1980) Market structure and behavior. Harvard University Press, Cambridge
Singh N, Vives X (1984) Price and quantity competition in a differentiated duopoly. RAND J Econ 15:546–554
Stephen, Frank H (1994) Advertising, consumer search costs and prices in a professional service market. Appl Econ 26:1177–1188
Stewart, Michael J (1993) The effect on tobacco consumption of advertising bans in OECD countries. Int J Advert 12:155–180
Tirole J (1988) The Theory of Industrial Organization Cambridge, Mass. The MIT Press, Cambridge
Vives X (1990) Information and competitive advantage. Int J Ind Organ 8:17–35
von der Fehr N-HM, Stevik K (1995) Persuasive advertising and product differentiation. South Econ J 65(1):113–126